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Recent Advancement in the Management of Type-1 Diabetes in Children with special reference to *Sahaja Prameha*

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ABSTRACT

BACKGROUND- Insulin dependent diabetes mellitus (IDDM) also known as type 1 diabetes occurs usually before 15 years of age, having utmost dependency over external insulin to normalize raised blood sugar. Diseases like diabetes are described in the Ayurvedic texts as a *Prameha*. The *Sahaja Prameha* is a type of *Prameha* and similarity of symptoms can be deemed near type 1 diabetes. **METHOD**- Research articles published in authentic journals were reviewed. Information about the diabetes and *Sahaja prameha* from the published books and the internet were also compiled to make a better outcome. **RESULT** – Herbs like *Leucas cephalotes* singly and combined effect of *Nigella sativa* and *Cinnamomum cassia* along with *Gymnema sylvestre* (Retz.), *Ferula foetida* (Bunge.), *Allium sativam* Linn. and *Murraya koengii* (L.) have been found for their glucose homeostatic action. *Memordica charantia* (Linn.) has shown pancreatic regeneration property, whereas *Tinospora cordifolia* has shown a good immune modulator action in their research studies. **CONCLUSION** –Insulin dependency, dose tolerance and late stage complications letting the researchers to move towards safe and effective treatment of IDDM. Evidenced based research studies are trying to create a better platform for efficient management of type 1 diabetes through Ayurveda.

KEYWORDS

IDDM, Type-1 diabetes, Ayurveda

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INTRODUCTION

Ayurveda "the science of life" successfully managing diabetes like disorders in the form of "*Prameha*" since thousands of years. *Prameha* is a condition known to have set of metabolic disorders presenting with urinary abnormality. Ancient Ayurveda texts described *Prameha* in the two forms; the first one is related to absurd, inappropriate and uncontrolled dietary habits known as "*Apathya Nimittaja"*[1]. The second one is *Sahaja Prameha*, which manifests due to familial tendency and genetic predisposition. It is described as "*Kulaja Vikara"* and "*Bija Prakriti Dosha"* in the Ayurveda texts[1, 2]. *Shushruta Samhita*, one of the important ancient texts of Ayurveda explains that *Sahaja Prameha* is a "*matrapitra doshkruta"* disorder and happens due to defect in the parent's body constituents[1]. *Kashyapa Samhita* was the first text to describe the Prameha in children, giving its symptomatology in the *Vedana Adhyaya* as *"Akasmat mutra nirgam"* (Child does not have the sense of micturition)[3].

Acharya Bhel has given the term *"Prakritiprabhav"* for *Sahaja prameha.* It signifies that the disease presents by nature within the body from the birth itself[4]. This way of disease manifestation can be correlated with autoimmune dysfunction within the body[4]. Autoimmune dysfunction and genetic predisposition are the cardinal features of insulin dependent diabetes mellitus (IDDM) or Type 1 diabetes[5]. Hence, IDDM has a close correlation with *Sahaja Prameha*. Ayurveda, with its potent and safe medications can provide a better hope for the management of type 1 diabetes. This will make the child to enjoy his precious childhood period without any worry about the disease.

MATERIALS AND METHOD

The ancient Ayurveda texts; *Charaka Samhita, Sushruta Samhita, Bhel Samhita and Kashyap Samhita* were searched to compile the contents regarding *Sahaja Prameha*. The published articles from PubMed were searched by using the key words; type 1 diabetes and Ayurveda, *Sahaja Prameha* and *Madhumeha*. All the information related to the role of herbal medicines with type 1 diabetes were critically analyzed and presented here in this review.

STUDIES ON HERBS USEFUL IN TYPE 1 DIABETES

1.1 Hypoglycemic property

In different researches extract of plants separately or in combination were tested for hypoglycemic and glucose homeostatic properties. In an experiment,

Sptreptozotocin (STZ) induced type 1 diabetes in albino rats, having their fasting blood glucose level more than 250mg/dl were treated with extract of *Withania somnifera* Dunal, *Allium sativum* Linn., *Gymnema sylvestris* (Retz.) Schult, *Ferula foetida*(Bunge.) Reg. and *Murraya koengii* (L.) [6]. The hypoglycemic effect of *Withania sominifera, Allium sativum, Gymnema sylvestre*was established after three weeks of administration[6]. Here, in this experiment, *Ferula foetida* and *Murraya koengii* (L.) did not show any hypoglycemic effect[6]. *Leucas cephalotes* commonly known as *Drona Pushpi* also showed promising plasma glucose homeostatic effect when extracts of the plants administered in diabetic induced rats[7].

A combinatorial effect of extracts of *Nigella sativa* and *Cinnamomum cassia* in STZ treated diabetic model showed significant reduction in plasma glucose level[8]. A multi drug combination DIHAR containing extracts of *Syzygium cumini, Momordica charantia, Emblica officinalis, Gymnema sylvestre, Enicostemma littorale, Azadirachata indicia, Tinospora cordifolia* and *Curcuma longa* given in the combined form of 100mg /kg for 6 weeks produced decreases in serum glucose in STZ induced diabetic rats[9]. Neera Singh et al., also reported about the hypoglycemic action of *Momordica charanita* in animals, where insulin secretion was almost stopped[10].

1.2 Anti hyperlipidemic property

Leucas cephalotes extract in different combination when administered in type 1 and type 2 induced diabetic model showed antihyperlipaedmic activity[7]. Similarly a combinatorial effect of *Nigella sativa* and *Cinnamomum cassia* extracts in experimental diabetic model showed significant ($p<0.05$) reduction in the LDL, total cholesterol and triglycerides[8]. Research work having a multidrug combination DIHAR when given in a dose of 100mg/kg had shown the anti hyper-lipidemic property in STZ induced rats when treated for 6 weeks[9].

1.3 Cellular regeneration property

The combined extracts of *Nigella sativa* and *Cinnamomum cassia* showed significant improvement in the regeneration of pancreatic tissue in the diabetic experimental model[8]. Similarly slight improvement has been observed in the vascular degeneration of tubular epithelium of the renal tissue when the diabetic experimental models were treated with the combined extracts of *Nigella sativa* and *Cinnamomum cassia* in different doses[8]. In another study, acetone extracts of the whole fruit of *Momordica charanita* (bitter gourd) was given to alloxan monohydrate treated diabetic albino rats whose islets cells got

damaged. Results showed, various phases of recovery of Beta cells of langerhans of pancreas on Histopathological cell study[10]. The study also showed the presence of small, scattered islets among the acinar tissue in some experimental animals which may reflect information of islets from pre existing islet cells[10].

1.4 Kidney profile improvement property

In an experiment when the combined extracts of *Nigella sativa* and *Cinnamom cassia* was given to the STZ-treated diabetic model, significant (P <0.05) results were achieved in reducing the serum creatinine level[8]. Similarly, animal groups having raised Blood urea nitrogen (BUN) when treated with extracts of above mentioned Ayurveda drugs for 28 days showed significant (p<0.05) reduction in BUN[8]. Another experiment having the combined extract of various Ayurved drugs known as DIHAR showed promising results in lowering down serum creatinine and blood urea after 6 weeks of regular administration in diabetic induced rats[9].

1.5 Immune modulation property

Tinospora cordifolia commonly known as *Guduchi* has a multifaceted immune modulator potential[12]. Type 1 diabetes is accompanied by autoimmune response where progressive loss of pancreatic islets of β cells occurs. *Tinospora* improves immune response by altering autoimmunity. It causes deactivation of islets reactive lymphocytes correcting inflammatory environment that injures islets, promoting lymphocytic activation and restoration of adequate islet mass[13]. This immunnomodulatory potential becomes helpful in lowering down the blood glucose and glycosylated hemoglobin levels by facilitating the regeneration of pancreatic islets of β cells which is proved in further researches[14].

Table no. 1 here under shows a summarized charting of various evidence based Ayurveda drugs helpful in the management of *Sahaja Prameha* with minimal or negligible side effects. These drugs are equally helpful in the better management of various conditions like hyperglycemia, hyperlipidemia and disturbed kidney profile presented in IDDM cases and thus paves a healthier pathway for Type 1 diabetes cases.

DISCUSSION

Above mentioned studies marks the essentialities regarding management of type 1 diabetes. The glucose homeostatic effects can be achieved by single extract use of *Withania sominifera, Allium sativum, Gymnema sylvestre* [6].

Table 1 List of drugs helpful the management of type 1 diabetes along with their properties

S.no.	Botanical Name	Common name	Property
1.	1. *Withania somnifera* Dunal[6] 2. *Allium sativum* Linn[6] 3. *Caselpinia boducella* F.[6] 4. *Gymnema sylvestris* (Retz.)[6]	1. *Ashwagandha* 2. *Lasuna* 3. *Kantakikaranj* 4. *Gurmar*	Antihyperglycemic property
2.	5. *Leucas cephalotes*[7]	1. *Dronapushpi*	1. Antihyperglycemic property 2. 2.Anti hyperlipidemic property
3.	Combinatorial Effect of 1. *Nigella sativa*[8] 2. *Cinnamomum cassia*[8]	1. *Black Cumin* 2. *Cinnamon.*	1. a-glucosidase inhibitory activity. 2. Plasma glucose regulating activity. 3. Action on Lipid Profile 4. Kidney Profile Regulating Activity
5.	Multidrug combination *DIHAR*[9] 1. *Syzygium cumini* 2. *Momordica Charantia* 3. *Emblica officinalis* 4. *Enicostemma littorale* 5. *Azadirachata indica* 6. *Tinospora cordifolia* 7. *Curcuma longa*	1. *Jambu (Jamuna)* 2. *Karvellaka* 3. *Amala* 4. *Nagjivha* 5. *Nimba* 6. *Guduchi* 7. *Haridra*	1. Antihyperglycemic property 2. Anti hyperlipidemic property 3. Blood urea and serum creatnine normalizing property
6.	*Momordica Charantia*[10]	*Karvellaka*	1. Pancreases β cell regeneration property
2.	*Tinospora cordifolia*[14]	*Guduchi*	1. Antihyperglycemic property 2. Pancreases β cell regeneration property 3. Immune modulation property

All the above extract not only helps in maintaining raised blood sugar, but also regenerates glycogenesis thus improving glycogen storage in the liver cells[6]. A combined approach towards glucose homeostasis is also seen in the DIHAR compound administration in the diabetic models. This product also provides additional support of anti hyperlipidemic effect, normalizing serum creatinine, blood urea along with an increase in antioxidant enzyme activity[9].

The second and most important fundamental in the management of type 1 diabetes is the regeneration of islets in the pancreas. This is well achieved by long duration treatment with the *Momordica charantia* extracts. *Momordica charantia* alkaloids like Charantin, Kakra Ia, IIIa and IIIb are found to have the capacity to recover partially damaged β cells present in the islets of pancrease[10]. In an experiment, it was seen that on histopathological study, the above extract treated pancreas showed newly formed islets within 15 days[10]. These islets become larger and matured after a further 30 days of treatment[10].

A unique and safe immune modulator effect is also required in IDDM cases, as the main cause behind the whole scene is an autoimmune reaction. *Tinospora cordifolia, also* known as *Guduchi* is well established for its immune modulation property[11]. *Guduchi* also has an additional benefit in regenerating β cells of the pancreas[14]. This was observed in an experiment when Tinaospora extract administered to STZ treated rats for 100 days[14]. This raised the C peptide level in blood. C peptide a cleavage product of proinsulin molecule is a surrogate marker for insulin release[14]. However, this is not proportionate with insulin release because insulin has a short half life of 4 – 5 min. Regular use of *Guduchi* also helps in preventing diabetic complications like diabetic retinopathy, diabetic neuropathy, diabetic nephropathy and helps in healing of diabetic ulcers[12]. This discussion may form an alternate and safer management of IDDM in children and adolescent requiring at least two injections per day of short and intermediate acting insulin to achieve the satisfactory metabolic control[5]. All the above mentioned drugs are safe and having potent action, however they are yet to be tested in human beings for their required effect. These drugs should also be tested in IDDM affected humans together with insulin first to slow down the dose resistance and related complications. Later, if the beneficial effects get established the Insulin should be slowly tapered off.

CONCLUSION

Type 1 diabetes is an appalling disorder in children with absolute dependency on external insulin. This is also called as the silent epidemic devastating the quality of life in kids suffering from Type 1 diabetes. So, from the above review it can be concluded that Ayurveda drugs have a safe approach towards *Sahaja Prameha* and clinical features of Type 1 diabetes. Hence, the above mentioned drugs can be used to reduce total dependency over external insulin. These drugs also help in proper management of the root-cause that is the regeneration of insulin producing cells in the pancreas. However, most of the researches discussed here, were performed on the induced diabetic models and hence require further evaluation and vigorous research work to prove their efficacy on human subjects.

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1.CONFLICT OF INTREST STATEMENT

No conflict of interest.

REFERENCES

1.Shastri (2005), Ambika data, Ayurvedtatva sandipika tika on Shushruta Samhita, Chikitsa sthan.Prameh chiktsa Adhyay, 11/03 Chaukhamba Publication, New Delhi, 59.

2.Agnivesha, Charaka, Dridhabala (2003) Charak Samhita, Chikitsa Sthana, Prameha Chiktsa Adhyay, 06/57, Edited by Vaidya Bramha Nand Tripathi, 1st edition, Chaukhamba Subharati Prakashan, Varanasi, 295-296.

3.Kashyap samhita, sutra sthana Vedana adhyay 25/22. Maharshi university of management Vedic literature collection (2002), 26.

4.Bhel samhita, nidana sthana Prameh nidan 6/01. Maharshi university of management Vedic literature collection (2002), 82.

5.Neeraj Jain, Vibha Mangal Jain (2012). Diabetes Mellitus in children: A challenge Ahead; Advances in Pediatrics; Second Edition; New Delhi; Jaypee brothers Medical Publishers (P) Ltd; p. 1237-46.

6.Sarika J. (2006), Efficacy Of Standardized Herbal Extract In Type 1 Diabetes – An Experimental Study. Afr. J. Traditional, Complementary and Alternative Medicines, 3 (4), 23-33. Available from http://www.africanethnomedicines.net.

7.Bavarva JH, Narasimhacharya AV (2010), *Leucas cephalotes* regulate carbohydrate and lipid metal and improves antioxidant status in IDDM and NIDDM rats. J Ethanopharmacol.127 (1): 98-102.

8. Ginpreet Kaur, Mihir Invally, Mohammed Kamil Khan, PriyankaJadhav (2008). A neutraceutical combination of *Cinnamomum cassia* & *Nigella sativa* for Type 1 diabetes mellitus. Journal of Ayurveda and Integrative Medicine, 27 – 37.

9. Snehal S Patel1 (July 2009). Antihyperglycemic, antihyperlipidemic and antioxidant effect of DIHAR, a polyherbal Ayurvedic formulation in streptozotocin induced diabetic rats, Indian journal of experimental biology. 47, 564-570. Available from http://www.ncbi.nlm.nih.gov/pubmed/19761040.

10. Neera Singh and Manushma Gupta (2007). Regeneration of β Cells in islets of Langerhans of pancreas of alloxan diabetic rats by acetone extract of *Momordica charantia* (Linn.) (Bitter guard) fruits. Indian Journal of experimental biology. 45, 1055-1062. Available from http://www.ncbi.nim.nih.gov/pubmed/18254212.

11. Harrison L, C, Honey MC (1999). Cow's milk and type 1 diabetes, the real debate are about mucosal immune function,

diabetes. 1501-1507. Available from: http://www.ncbi.nlm.nih.gov/pubmed/10426365.

12. Rohit Sharma, Hetal Amin, Galib, Pradeeep Kumar Prajapati (2015), Antidiabetic claims of *Tinospora cordifolia* (Wild) Miers: critical appraisal and role in therapy. Asian Pacific Journal of Tropical Biomedicine. 5(1): 68-78.

13. Sharma, Kapil A (1997). Immune potentiating compounds from *Tinospora cordifolia*, journal of Athena pharmacology. Vol. 58 (2), 89-95. Available from: http://www.ncbi.nlm.nih.gov/pubmed/6406896

14. Nirmala Arul Rayan, Pitchai Daisy (2009), Anti – diabetic properties of Tinospora cordifolia stem extract on streptozotocin – induced diabetic rats. African Journal of pharmacy and pharmacology. 3(5): 171-80.